Value Stream Mapping and Simulation Modelling for Healthcare Transactional Process Improvement

Work in Progress

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Research Background: Lean management philosophy was originated in Japan from the Toyota production system. The main idea is to determine and eliminate waste. The concept of end-to-end value allows organizations to achieve competitive advantage through best quality product and services through minimum operational cost. These days there is more to be achieved by applying lean to services and transactional processes floors. Lean facilitators are facing challenges when trying to transform an organization to be a lean enterprise because it is possible in production systems, but that is not easier in the services and transactional sectors, which means there are challenges that should be considered. Some of the challenges for the service sector are; complex and mixed value streams, information and people are processed instead of parts and human interaction is a major part of the service sector.

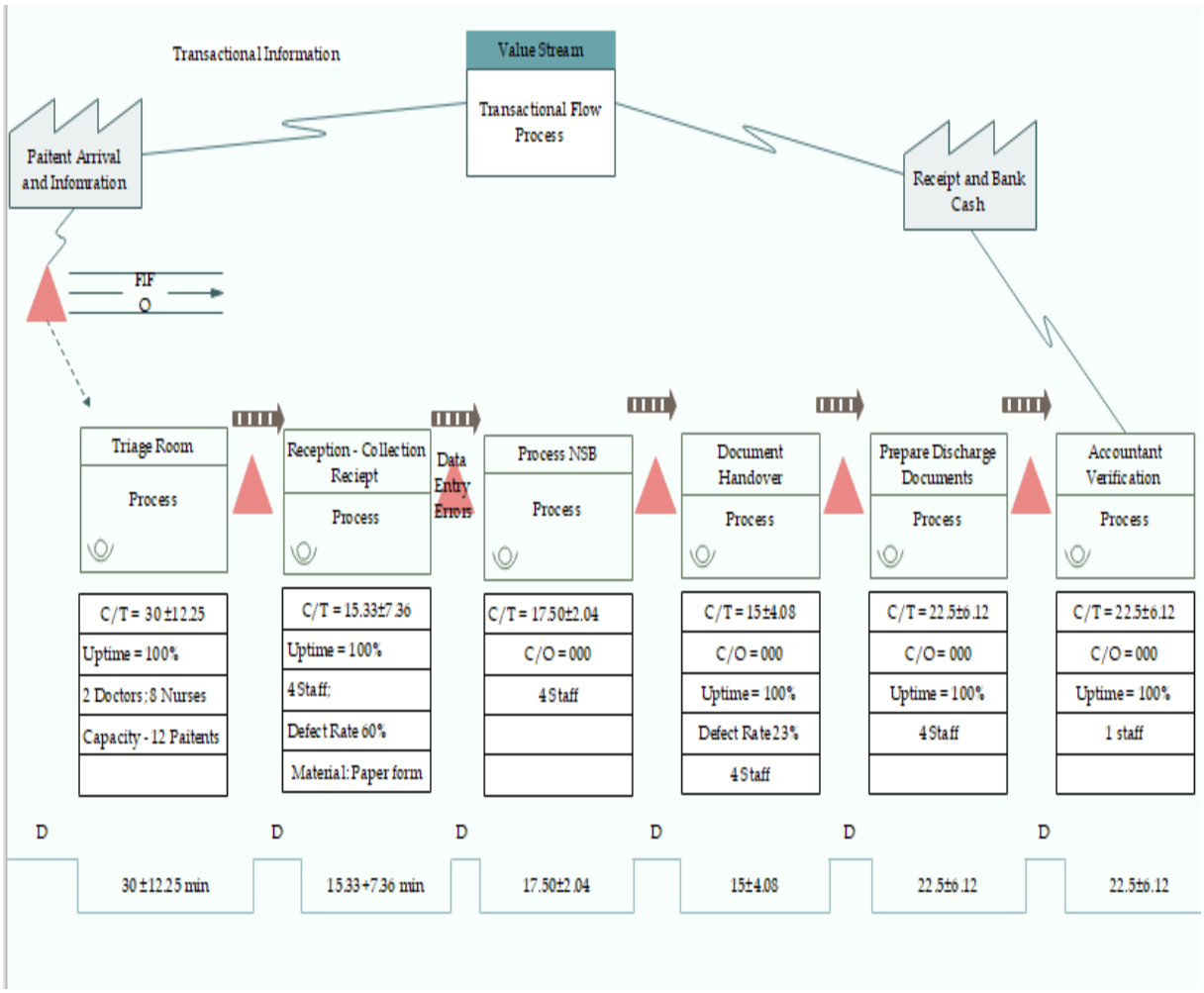
Lean philosophy requires the application of lean tools in a structured manner, which are specific towards understanding and analyzing the process. Making the organization adopt greater performance. Transactional Flow Processes (TFPs) do not have physical characteristics like manufacturing processes. But the complexity and volume of TFPs that need to be performed by healthcare, financial and other data processing departments still need the strictness of Lean Six Sigma. In TFPs area there are many tools that can be used to improve the processes such as; Project charter, suppliers- inputs-process-outputs- customers (SIPOC) diagram, value stream map (VSM), cause-and-effect diagram and selection matrix also Process-failure mode and effects analysis (P-FMEA). The Lean techniques aim at eliminating the wastes from a process and improving the resultant performance. These techniques remain as one of the most desirable tools for organizations and systems which seek to advance and improve their performance and operations. Lean Philosophy is usually applicable in nearly all the systems.

The TFP requires the relationship various processes, stages, and activities which work towards common objectives. The systems and processes usually rely on the information or output from one level to another to generate the intended results. Due to the level of interdependence among various stages and the level of interactions of various activities, there is a possibility to

implement the concept of lean in the TFP. The occurrence of various levels of activities within the TFP requires the consumption of time. The processing of information within the department is regarded as processing time. For example, the time required to enter the patient's information to the system, the time taken to get into the examination room and the time for preparing the services' bill [Figure 1]. Modification of TFP duration by eliminating the NVA and reducing the time spent during the VA process would allow meeting current demand (Takt) and future demand growths. Based on the VSM showed next section, In HCS, there are processes and procedures through which a patient goes. For example, the patients usually pay for the various procedures and services before proceeding to the actual treatment room. Waste is recognized in the form of motion, defects and waiting, for instance, checking the doctor treatment advice by the cash collector and calculating the services' prices. This, therefore, reduces the speed of offering services to the patients.

Completed work:

Value stream mapping: VSM is one of the tools specific to the lean approach. This mapping technique allows for the flow of materials as well as information. Also, it permits for the categorization of activities into three major categories which include Value Enabling (VE), Value Adding (VA) and Non-Value-Adding (NVA). The separation of activities into these three categories allows for an easy implementation. The basic aim of this tool is to identify and target all the NVA activities for elimination. Eliminating such processes and activities out of the system allows for a provision to maximize value by integrating the VA activities. Also, the VE activates need only to be accepted to the extent that they contribute towards the general focus of value addition. The VSM tool considers the relevance of improving the value of the entire production, service delivery and the provision of better performance. Moreover, VSM of a TFP shows a large challenge than the mapping of production process, this can be clearly seen in; "Many perceived transactional processes are nothing more than production processes. And, many transactional processes are service or support functions, which may be similar in appearance but, contain much different information and are interpreted in a slightly different way". In this case, the value stream of transactional processes may differentiate from the productions VSM concept. For example, production processes need suppliers and external sources, while the customers in the transactional processes can be the suppliers or the control point of the entire process. Also, TFP involves information and people processing. Figure 1 highlights the VSM for the TFP. Based on the current state map VA time is 255 min, NVA time is 19 min and cycle time is 274 min. Based on the average time only 93% of the processing time is the VA time. However, this includes all the rework with respect to different processing steps. Above VA represents a mixed VSM representing the job shop and batch processing system. For instance, in current state Reception, Process Non- Saudi Benefits (NSB), Document Handover and Prepare Discharge Document represents a job shop scenario where each patience is processed based on individual needs, whereas cash collection and accountant verification are the batch processing.



Work in Progress: VSM developed through this process is sent to the health economics department at KSMC to get the feedback and researcher is in the process finalizing interviews and questionnaire results. The survey questions were answered by 50 respondents; all of them are involved in the Cash Income Collection Procedure (CICP), which is the main process under investigation. The survey results will be combined with the VSM information to develop a discrete event simulation model and experiments. Researcher in intending to use Simio to model the transaction process flow and Taguchi orthogonal arrays for experiment design. Results from the simulation model will be analyzed to understand the impact of various factors on the TFP.